

### **REMARKS**

Claims 18-30 and 47-55 are pending. Claims 31-46 and 56-96 were earlier temporarily withdrawn pursuant to an election of species requirement, although Applicant understands and requests that these withdrawn claims be examined should generic claims to the elected specie be found patentable.

#### **Claim Objections:**

The Examiner objected to the use of the chemical notation "Si3N4" in the claims. This issue has been addressed by amendment.

#### **Prior Art Rejections:**

In responding to the Examiner's prior art rejections, Applicant here only justifies the patentability of the non-allowed independent claims 18 and 47. As the Examiner will appreciate, should these independent claims be patentable over the prior art, narrower dependent claims would also necessarily be patentable. Accordingly, Applicant does not separately discuss the patentability of the dependent claims, although it reserves the right to do so at a later time if necessary.

Claims 18 and 47 have been rejected under 35 U.S.C. § 103 as obvious given the combination of USP 4,642,160 ("Burgess") and USP 4,513,055 ("Leibowitz").

Burgess, the primary reference relied upon by the Examiner, discloses a traditional printer circuit board (PCB) and method of its manufacture. The Examiner contends that Burgess discloses all of the limitations of claims 18 and 47, except the limitation of a second material having a negative coefficient of thermal expansion (CTE). Specifically, the Examiner contends that Burgess' bonding sheet 16 (an insulator) comprises Applicant's claimed first material; that copper foil 18 comprises Applicant's claimed second material; and that Burgess' aperture 28 comprises Applicant's claimed aperture formed in both the first and second materials. In other words, the Examiner finds all of the limitations of claims 18 and 47 in Burgess, except that Burgess' copper layer 18 (i.e., the second material) does not have a negative CTE.

However, the Examiner contends that Leibowitz contains this missing limitation. The Examiner further contends that one of ordinary skill in the art would have been motivated to have modified Burgess to incorporate a negative CTE material for Burgess' copper layer 18, to "prevent[] unwanted expansion and contraction when the electronic component is mounted on a PCB." Office Action, ¶ 5 at pg. 3.

However, contrary to the Examiner's reading of Leibowitz, Leibowitz does not disclose use of a negative CTE material. Leibowitz discloses a composite layer 10 comprising a fabric 14 formed in a resin 16 useful for forming a printed circuit board (PCB), but this composite layer 10 is not a material that exhibits a negative thermal coefficient of expansion, i.e., a material which shrinks upon heating. The whole goal of Leibowitz is to form a PCB that matches the typically-higher positive CTEs of the ceramic integrated circuits which will be placed on the PCB so that thermal mismatch does not cause the two to crack at their boundary. See Col. 2, ll. 6-18; Col. 1, ll. 50-58. To achieve this goal, i.e., to reduce the CTE of the PCB, one of two of the yarns 18, 20 in the fabric 14 is a negative CTE material (Kevlar). But the overall composite 10 is expressly disclosed in Leibowitz as having a *positive* coefficient of thermal expansion, see Col. 5, ll. 7-21, which is not surprising because the ceramic chips to be mounted on these boards (and to which thermal matching is desired) also exhibit a positive coefficient.

In short, neither Leibowitz nor Burgess disclose use of a negative CTE material, and hence, even when taken together cannot render claims 18 and 47 obvious. See MPEP § 2143.03.

A further reason exists for why claims 18 and 47 are not rendered obvious by Burgess and Leibowitz, and such further reason shows that the Examiner is incorrect in concluding that one of ordinary skill in the art would have been motivated to have modified Burgess in light of Leibowitz.

The Examiner assumes that Burgess's second material, copper layer 18, could simply incorporate a negative CTE material such as that disclosed in Leibowitz. Whether the relevant material in Leibowitz be considered the negative CTE yarn itself (Kevlar; col. 3 ll. 31), or the negative CTE yarn fabric as enmeshed in its insulative matrix (epoxy resin, polyimide resin, or PTFE resin; col. 3, ll. 27-28), the fact remains that the relevant

material in Leibowitz is clearly an *insulator*. Indeed, the composite layer 10 is specifically used in Leibowitz's PCB as the insulator between copper layer 22 (see Fig. 3).

However, the material in Burgess which the Examiner contends one skilled would modify in light of Leibowitz, i.e., copper layer 18, is a *conductor* which carries signal on Burgess' PCB. Thus, the Examiner argues that one skilled in the art would be motivated in light of Leibowitz to modify Burgess' conductive, signal-carrying layer 18 into an insulative layer (Kevlar, epoxy, etc.) incapable of carrying a signal.

Obviously, the Examiner's argument is not tenable. One skilled in the art would not be so motivated, because such motivation would illogically lead to a structure which was inoperable. As the Examiner is well aware, an obviousness theory for suggestion/motivation to combine various prior art references that results in an inoperable structure cannot be legally sustained. See MPEP § 2143.01 ("If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification."). Therefore, for this additional reason, neither claims 18 nor 47 are shown as obvious given the combination of Burgess and Leibowitz.


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The Applicant submits that pending claims 18-30 and 47-55 are patentable over the prior art of record. The Applicant thus requests that these claims be deemed allowable, and that the Examiner continue to examine the other claims (31-46, 56-96) that currently stand withdrawn as directed to unelected species.

Please feel free to contact the undersigned with any questions relating to this submission.

Respectfully submitted,

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